

REMARKS

Claims 1-4 and 7-12 were presented for examination, claims 5 and 6 having been previously withdrawn in response to a Restriction Requirement. Applicants amend claim 7 herein to better claim the invention. No new matter is added by this amendment. After entry of this amendment, claims 1-4 and 7-12 remain pending, of which claims 1 and 7 are independent. Applicants respectfully traverse the outstanding rejections.

Rejections under 35 U.S.C. §103(a)**Rejections in view of Sugita and Suzuki**

Claims 1-4 and 7-12 stand rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 6,455,179 to Sugita (hereafter “Sugita”) in view of U.S. Patent Application Publication No. 2001/0021467 to Suzuki (hereafter “Suzuki”).

Applicants believe the Examiner means to reject claims 1-4, 7-8, and 10-12 under 35 U.S.C. §103(a) in view of Sugita and Suzuki (and not claim 9). Although the Examiner includes claim 9 in this rejection, claim 9 is not addressed in the rejection under Sugita and Suzuki and, indeed, at page 6 of the Office Action, the Examiner recognizes that “Sugita and Suzuki are silent to a fuel box, the end plates of the two fuel cell stacks being fixed to the fuel cell box,” as recited in claim 9. Out of an abundance of caution, because claim 9 is listed as rejected in view of Sugita and Suzuki, Applicants respectfully traverse the rejection and respectfully submit that a *prima facie* case of obviousness has not been established with respect to claim 9 in view of Sugita and Suzuki because, as the Examiner recognizes, Sugita and Suzuki do not disclose or suggest at least a fuel cell box, the end plates of the two fuel cell stacks being fixed to the fuel cell box.

The presently claimed invention is generally directed to a fuel cell system involving two fuel cell stacks, with a humidifier disposed between the fuel cell stacks. The heat generated by the stacks raises the temperature of the humidifier, which prevents condensation from forming in the passages within the humidifier through which reaction gasses pass. In some embodiments, the stacks are connected to the humidifier through a bifurcated supply line which connects the stacks to the humidifier such that the gas travels approximately the same distance from the

humidifier to each stack. This similar distance results in an equalized supply of reaction gas to each stack. Further, the claimed configuration allows, in some embodiments, a particular arrangement whereby pressure loss can be reduced while dead space may be utilized effectively.

Accordingly, independent claims 1 and 7 recite *wherein the humidifier is disposed between the two fuel cell stacks*. Applicants respectfully submit that neither Sugita nor Suzuki discloses or suggests at least this feature of claim 1.

The Sugita reference discusses first and second fuel cell stacks arranged side-by-side (Sugita at Fig. 1). In the Sugita reference, first and second connecting plate sections are electrically connected by flexible strand wires, so that stress that would otherwise be caused by vibrations at a connecting portion can be avoided. However, as the Examiner recognizes at page 3 of the Office Action, Sugita does not disclose a humidifier (any humidifier, regardless of orientation in relation to the fuel cell stacks). The Examiner instead relies on Suzuki for a humidifier.

The Suzuki reference is generally directed to a humidifier with a construction designed to generate a turbulent flow on the inner surface of the housing or within hollow fiber membranes. This improves the ratio of moisture recovery of the humidifier and improves the recovery of water when dry air flows outside a bundle of hollow fiber membranes.

The Suzuki reference does discuss utilizing the humidifier in a fuel cell. However, independent claims 1 and 7 each recite that *the humidifier is disposed between the two fuel cell stacks*. In Sugita, there are two fuel cell stacks but no humidifier. In Suzuki, there is a humidifier, but only one fuel cell stack. Accordingly, neither reference discloses or suggests *a humidifier disposed between two fuel cell stacks*.

Further, the Examiner does not allege that either reference discloses a humidifier disposed between two fuel cell stacks, and does not state in the Office Action that it would have been obvious to dispose the humidifier of Suzuki between the fuel cell stacks of Sugita. Instead, the Examiner only asserts that it would have been obvious “to have provided the humidifier of Suzuki at the fuel gas supply port of the fuel cell system of Sugita because Suzuki teaches that the power generation efficiency of the fuel cell system is reduced if the electrolyte membrane is dried” (Office Action at pages 3-4). However, providing the humidifier “at the fuel gas supply

port” is not what is claimed. The claims require that the humidifier be provided between the fuel cell stacks, and such a configuration is not disclosed or suggested by the cited references.

Accordingly, Applicants respectfully submit that a *prima facie* case of obviousness has not been established with respect to independent claims 1 and 7.

Indeed, Sugita states at numerous locations that the fuel cell stacks should be in close proximity to each other (see, e.g., Sugita at col. 10, lines 1-4, and Sugita at col. 7, lines 41-45). Accordingly, it appears that Sugita teaches away from providing any components between the fuel cell stacks (since this would not allow the stacks to be provided at “mutually close positions” as required by Sugita).

Moreover, claim 1 requires that the lengths of the respective portions of the bifurcated supply pipe are substantially the same. As further recited in the claim, the supply pipe connects the humidifier to the fuel cell stacks, and no such supply pipe is present in the Sugita reference. There is no teaching or suggestion in the cited prior art references to use a bifurcated supply pipe having equal length portions – indeed, the supply pipes of Sugita have portions of unequal length (see, e.g., Figure 1, elements 218, 214, and 206). Accordingly, Applicants further submit that neither Sugita nor Suzuki discloses or suggests that *the reaction gas supply pipe is bifurcated at a bifurcation point into two portions directed toward the two fuel cell stacks respectively, the lengths of the portions from the bifurcation point to the reaction gas supply ports of the two fuel cell stacks being substantially the same*, as recited in claim 1.

With respect to dependent claims 4, 10, and 11 Applicants respectfully traverse the Examiner’s assertion at page 5 of the Office Action. Claims 4, 10 and 11 recite specific configurations for the humidifier and fuel cell. The Examiner asserts that, “in combining the humidifier of Suzuki with the fuel cell system of Sugita, the arrangement of the humidifier and the fuel cell stacks relative to the horizontal and the vertical is a design choice and does not inhibit or enhance the performance of the combination.” Applicants respectfully disagree. The particular configurations recited in claims 4, 10, and 11 do enhance the performance of the claimed fuel cell. As noted above, the recited configurations at least help to prevent condensation from forming in the passages within the humidifier through which reaction gasses pass. Further, the recited configuration allows for a more compact fuel cell to be realized, which allows a designer to deploy the fuel cell in a confined space.

Rejection in view of Sugita, Suzuki, and Kikuchi

Claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Sugita and Suzuki, and further in view of U.S. Patent Application Publication No. 2002/0142209 to Kikuchi (hereafter “Kikuchi”). Applicants respectfully traverse the rejection.

As noted above, neither Sugita nor Suzuki disclose or suggest at least that *the humidifier is disposed between the two fuel cell stacks*, as recited in claim 7. Claim 9 depends from claim 7, and therefore includes each and every feature of claim 7. The addition of Kikuchi does not cure the factual deficiencies of Sugita and Suzuki with respect to the above-quoted feature.

Kikuchi is generally directed to a hinge mechanism in which pins are engaged into through-holes of tab sections to provide a fuel cell stack (Kikuchi at Abstract). It appears that Kikuchi is entirely silent with respect to a humidifier, and accordingly does not disclose or suggest *a humidifier is disposed between the two fuel cell stacks*, as recited in claim 7.

In light of the above, Applicants respectfully submit that Sugita, Suzuki, and Kikuchi, alone or in any reasonable combination, do not disclose or suggest each and every element of claim 9. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the 35 U.S.C. §103(a) rejection of claim 9.

CONCLUSION

Applicants respectfully submit that the pending claims are in condition for allowance.. If further issues persist, we invite the Examiner to call the undersigned at the below noted number.

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